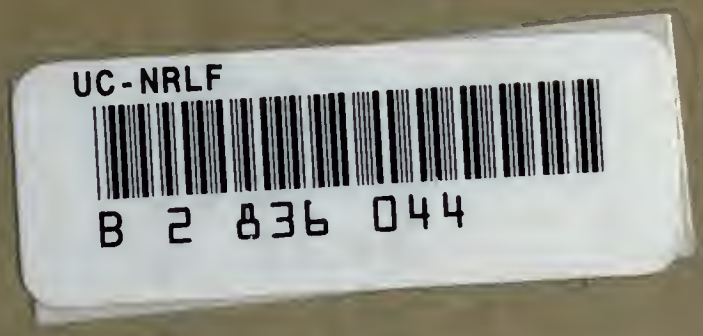

MELLON LECTURE

(UNDER THE AUSPICES OF THE SOCIETY FOR BIOLOGICAL RESEARCH)

UNIVERSITY OF PITTSBURGH

FOURTH LECTURE

THE PROBLEM OF THE RECONSTRUCTION AND RE-EDUCATION OF THE DISABLED SOLDIER

BY

ROBERT W. LOVETT

1918

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APPROXIMATELY a year ago the United States entered the European War. During that year hundreds of thousands of young men have left their homes, their people and their occupations and have entered the service of the United States to fight its battles. These men were not only in the most active and vigorous period of life, but having been examined for physical soundness before entering the army, they represent a highly selected class of sound, active individuals of great value to the community.

The experience of Canada has shown that out of every million men sent overseas, 100,000 or 10 per cent, will have, within one year, been sent home as unfit for further military service. Of the 100,000 thus sent home, 80,000 will be able in most instances to return to their former occupations. The other 20,000 will have been so badly disabled that they cannot return to their former trade or occupation and must be partly or wholly re-educated to some new one.

The governments at war recognize their responsibility to return these men to civil life in as nearly as possible the same condition as that in which they were taken from it. It may be possible to return them on a higher level of economic value or it may be on a lower level, but it has been definitely established that each government concerned will

do its utmost to restore to each disabled man the highest degree of economic efficiency attainable, not as an act of charity but as a discharge of a legitimate indebtedness. The present address deals with the means by which this is to be accomplished.

The problem concerns the public in two ways. First, there are few homes where some near or distant relative or friend is not or will not be in the service and, second, the success of the movement to be described here must depend finally upon sound public sentiment and the education of the public to an appreciation of the character and gravity of the problem to be met. For this reason before discussing the specific question of ways and means, something must be said of the proper attitude of the public toward these returned disabled men. Those soldiers who return without an arm or a leg or with a disabled or useless limb are not to be regarded as poor cripples to be commiserated and set apart as unfortunates whose usefulness is ended. They will not in the future be compelled or allowed to sell lead pencils or boot laces on the street corners as their most suitable occupation. They are rather to be regarded as public spirited citizens who have incurred some physical disability in the pursuit of their service to their country, a disability to be regarded as a badge of honor rather than as a physical defect. This disability in most cases can be, in greater or less measure, compensated for by proper treatment and training, and in many instances the disabled man will find himself in a position to earn better wages than ever before in his life. To substantiate this somewhat optimistic point of view, one may quote briefly French and German experience.

The loss of an arm of course constitutes a more serious problem industrially than the loss of a leg. At the school at Lyons, toy-making and parts of bookbinding are taught to one armed men. At Montpellier, wood turning, tailoring and boot making also proved available. Of other occupations for such men are basket work, drawing, horticulture, telegraphy, clerical work, stenography, etc.

With regard to the loss of a leg, the experience of the English Soldiers and Sailors Help Society is of importance. They consider "that the loss of one leg does not debar a man from being quite as useful as he would be with two legs, provided a little care is taken with him in the early stages; and we consider that if we were to take two men, the one having all his limbs and the other minus a leg, we should be more successful with the man minus a leg than with the able bodied one, for this reason, that the man with one leg realizes that he is not quite so useful as the other man and therefore lays himself out to be as useful as he can possibly manage to be. We can arrange suitable work for men who have lost both legs: it is only a matter of getting a man onto his bench or into his chair each morning."[1]

The attitude of regarding these disabled men as in any way objects of charity is wholly improper and unjust and should be condemned. They have earned the right to every care, every privilege, and every assistance that we can give them. They have fought our battles at the front during the war and we should regard it as our privilege to fight theirs at home after it. Nor should there be too large an element of sentimentality

[1] Hutt. Am. J. Care of Cripples, 1917, June.

and emotion in dealing with the problems mentioned. Heroes these men are, but they will be better served in the end if the public regards them rather as men whose wage earning capacity has been impaired, men to whom it is due that every effort be made to make this diminution as little as possible.

"In one of the allied countries the wife of a returned soldier complained to the representative of a patriotic relief agency, which had been attending to the family needs while the chief breadwinner was at the front, that her husband would never spend any time with her or the children. She had wanted that afternoon to have him accompany them to the park but he disdainfully refused, saying that he was going out for an automobile ride and later to a 'sing song' at one of the fashionable hotels. The musical entertainment referred to was being provided by the society ladies of the city."[1]

This problem of the attitude of the public and of educating it to better things is of very great importance because the cripple of the past has been regarded askance, as a poor unfortunate, greatly to be pitied, to be stared at in public and petted and spoiled in private. This attitude is well presented in a novel which was in vogue some years ago called *Sir Richard Calmady* by Lucas Malet, where the crippled hero's disability and peculiarities are harped on and discussed, dwelt on at every turn and his life is centered around his peculiarity, which is constantly emphasized by all those about him. So well does it embody all that we ought to condemn that I have often asked classes of medical students to read the book in order to learn what attitude to avoid.

[1] McMurtrie. The War Cripple. Col. War Papers, Ser. 1, No. 17.

Take rather as a model of what is desirable, the attitude of a young woman of twenty-six who appeared at a recent orthopedic clinic held in connection with the Army Medical School in Washington, whose story only came out when she was questioned in the amphitheatre. She had been injured in an automobile accident six years ago when an overturned car had pinned her beneath and had fractured her spine. An unsuccessful operation had been performed and since the day of her accident she had been wholly paralyzed from the waist down. For the first year she had been treated, but for five years nothing had been attempted. With casters put onto an ordinary kitchen chair she had managed to do the housework for a family of five. She had done the cooking, made beds, swept, scrubbed, cleaned paint, washed windows, done some gardening and had so far as I could learn done all these things without a thought of commiserating herself or asking for sympathy or assistance. Some friend had insisted on her coming to the clinic. Contrast this healthy minded attitude with the morbid, shrinking, self-indulgent, self-conscious attitude so often possessed by the cripple, and see what a great advantage there is in inducing people to adopt the healthy and sane, rather than the morbid and commiserating, view toward these returning soldiers.

So strongly do I feel the disadvantage of dwelling too much on the term cripple that in this address it will be my attempt to avoid the term "crippled soldier," so much in vogue in the newspapers, and to speak only of the disabled soldier.

Having thus considered the spirit in which the matter should be approached, we may come to the closer consideration of the prob-

lem itself. The term most often applied to meet the situation, and perhaps the best, is *Reconstruction.* The word reconstruction is also applied to the repair of the devastated regions in France and Belgium, such as the rebuilding of villages, the refurnishing of farms and houses, the replanting of orchards, etc., which activity is perhaps equally entitled to the use of the word reconstruction, but this double use leads to confusion and confusion will in the end prove detrimental rather than beneficial to both interests.

In this instance the term reconstruction will be used to designate the attempt to rehabilitate and if necessary re-educate the man who has been physically disabled. This attempt will fall into three divisions which are almost self-evident. First, the returned soldier must receive medical and surgical attention to determine whether he needs further operation and if he does, he must have it performed. Second, many of the men with surgical injuries require treatment to loosen up joints, develop muscles, free tendons, improve resistance to fatigue, and although this is partly accomplished by massage and similar measures, it has been found in this war that it is better brought about, when possible, by actual work either in bed, *bedside occupations,* or in shops equipped for the purpose known as *curative workshops* in which an occupation is pursued which is of itself curative. Third, the disabled man must in a certain number of instances be educated to a new trade or occupation inasmuch as he may be unable to follow his original one on account of the nature of his injury, and here comes in the third stage of reconstruction activity spoken of as "vocational training" or "re-education."

The stages of reconstruction may be tabulated as follows:

Reconstruction	Medical or surgical attention	
	Therapeutic measures	curative workshops, massage, gymnastics, etc.
	Vocational training	placement and follow up

The whole question of reconstruction in this paper will be discussed largely from the point of view of the orthopedic surgeon, not because it is the only point of view but because it is the one with which the writer is most familiar.

Care of cripples. At the beginning of the war in 1914 most of what we knew about the possibility of restoring usefulness to the disabled, we had learned from our attempts to help the cripple, or the crippled child whose functions had been impaired by disease or accident or by some congenital defect. Industrial schools and homes for cripples had been founded, societies in Germany and America had been formed for the study of the question and two journals, one German and one American, were devoted to the consideration of the subject. Up to 1832 the cripple had been wholly neglected as a public problem but in that year the Royal Bavarian School and Home for Cripples was started. America took no effective action in the matter until some sixty years later when a private educational and industrial school for cripples was started in Boston. That was in 1893 and represented the first American attempt at re-education along useful lines although there had been founded three homes for crippled children in the preceding few years.

When it came to convincing the public that the state care and education of cripples was advisable, necessary and economical, it was surprising to see what public inertia one en-

countered. The blind, the feeble-minded and the deaf mutes were recognized as proper subjects for state aid and instruction, but to one who was concerned in an attempt to convince the Massachusetts legislature that cripples were entitled to similar advantages, the unwillingness to take seriously the question was surprising, but although in the end the fight was won, only four states have provided such state care and education. Minnesota, New York, Nebraska and Massachusetts founded such schools in the order named between 1897 and 1906 inclusive.

Industrial cripples. The care and rehabilitation of the man crippled in industrial work was never considered in America a public problem and he has been from the outset neglected, and a great economic error has thereby been committed. However, that will never occur in the future for the lesson of what may be done in restoring the disabled soldier to usefulness is already being taken seriously in the industrial world in its application to those injured in the industries, a matter which will be discussed later.

Taking the situation as it existed in 1914, we had learned from this study of the attempt to improve the cripple that his mentality and outlook were unfavorably influenced by his disability, that he was uneducated, in a surprisingly large proportion of cases being wholly illiterate, that trades and wage earning occupations were often closed to him in his uneducated condition, but that in many instances by proper surgical attention, by general education and by special training, he could be made a wage earner and a useful citizen instead of being a burden on his family or becoming an almshouse charge. The patient with paralyzed legs and consequent

inability to get about actively is just as useful as anyone else as a typesetter, leather worker, or a designer. A girl with paralysis of both arms in the Massachusetts Hospital School at Canton, Massachusetts, was taught to use her feet as hands and in a sewing competition among the town pupils won first prize for her sewing and embroidery. A baseball nine was formed at this school and in a series of games in one of the school leagues one summer, this team won two games out of every three played in competition with healthy boys of their own age. The catcher had two artificial legs and his base running was done for him by a boy with useless arms but good legs. Thus through the nine the job was adapted to the disability of the individual. We had learned that the individual within proper limits could, to a large extent, be educated on new lines and that, to a certain extent, the job could be adapted to the individual.

In England an attempt to salvage disabled soldiers was begun after the Boer war and workshops were established by the Incorporated Soldiers and Sailors Help Society in London which after the death of Lord Roberts were called the Lord Roberts Memorial Workshops. The object of these shops was "to teach useful trades to men discharged as medically unfit who, by reason of their disability . . . are unable to take ordinary employment and to make such cases as far as possible self supporting."

There should be added to the knowledge existing in 1914 derived from the study of the cripple and from the experience of England just mentioned, a small amount of information from a few schools for those injured in industry, such as that at Charleroi under M.

Baséque, who put this experience into use in the École Joffre in Lyons.[1]

With this stock of knowledge, England, France, and Belgium started in soon after the beginning of the war applying the facts thus learned to the repair and re-education of the disabled soldier. This attempt has been attended by very marvelous results and in this country we start in with the great advantage of being able to draw on the experience of these nations in meeting a problem similar to the one that now confronts us. The data here presented are necessarily derived from the experience of these other nations.

The keynote to the whole situation seems to be that man is an adaptable animal, mentally and physically, that in his daily routine he is probably using but a small part of his real capabilities, that his life occupation is not necessarily the one for which he is best fitted and that he is often not educated up to his regular job. If, therefore, a man is so injured that he cannot return to his old work, the question arises as to what work he is physically and mentally fitted to perform and among such jobs, which one attracts him. Moreover, a little education might help him to a better job within limits than he had before. We can count on adaptability as enabling the intelligent man to adapt himself to his work, so that the work need not wholly depend on being adapted to the man.

Progress of the soldier. To take up now the specific problem to be discussed, we must start with the soldier's injury. The man who is wounded in action receives his first surgical attention from the regimental or battalion surgeon at the first aid post, generally situated in a dugout a few hundred feet behind the first

[1]Hannan. Contemporary Review, 1916, p. 105.

line trench. Conditions are not favorable at this place for more than first aid. He then either walks or is carried through the communicating trenches to a point about a mile back where he is placed in a motor ambulance and carried to the field ambulance dressing station about three miles back of the front line trench. Here he receives an inoculation against tetanus, his wound is redressed, he is given a hot meal and is carried on in a motor about five miles farther to the casualty clearing station. Here he receives his chief surgical attention, he is X-rayed if necessary, operated on if need be, perhaps redressed, put in bed, nursed, fed, and cared for until he is able to be transported by train to the base hospital, a journey of some hours; and in this base hospital he can be kept as long as need be. In general it has not been found advisable in Canadian experience to keep a man in Europe over three months. A man obviously permanently disabled is generally returned home in about two months, while doubtful cases are retained about three months to see if they are likely to be able to return to active military service. From the base hospital he either returns to the front, after perhaps a stay in some convalescent home, or he is invalided home as probably or manifestly unfit for further active war service.

With regard to the number of men who are returned to the front for active service from the base hospitals in the year ending April, 1915, the Germans claimed from 87 to 91 per cent. Data made early in 1917 by a Copenhagen society give for the central powers and allies about 70 per cent to be returned to the front. It is stated in a military periodical[1] that in the battle of the Somme there were

[1]Military Surgeon, 1916, Dec.

some 2600 wounded British each day of whom 85 per cent returned to active duty. Well informed authorities regard the German claims as quite exaggerated while others would place the figure at 80 per cent or higher on the Western front for both allies and central powers.[1] The fact is that there are as yet no reliable data available on which to base an exact estimate but there is no great doubt that more than half of the wounded who reach a base hospital are capable of returning to duty in a few weeks. An English estimate[2] gives the following percentages: In the so-called command depot at Heaton Park within a period of six months from the date of injury about 50 per cent rejoined their original units, 15 per cent were sent to service in communicating lines abroad, 15 per cent were useful for sedentary occupations at home and somewhat over 20 per cent were discharged as permanently unfit, many of these having been untreatable from the outset. Of the men thus invalided home, Belgian experience has shown that 80 per cent are capable of vocational re-education, while 20 per cent must be regarded as permanently incapacitated for wage earning activity on account of the nature of their injuries. Of those who are suitable for re-education, 45 per cent can be made to earn their normal wages, 20 per cent can be partially restored and can earn an appreciable wage, while 15 per cent can be repaired to an extent to earn a salary which will constitute a bare livelihood.

Method. On the arrival of the soldier at a home port, he is either discharged permanently to his home after examination or is sent to a reconstruction hospital, after a short furlough

[1] Rubinow. Red Cross Inst. for Disabled Men, Bulletin No. 4.
[2] Mackenzie. Brit. M. J., 1916, August 12.

at home, which has been found desirable when it is practicable and the soldier is able to travel. This conduces to a better mental attitude and greater content. The men discharged permanently are those who are unfit for further military service and who are not in need of further surgical or therapeutic attention, most of whom are able to pursue their former lines of work without re-education.

Of the returned men, 75 to 85 per cent are to be classed as orthopedic. The definition of orthopedic as established by the ruling of the Surgeon General of the United States, of August, 1917, a ruling which is in general accord with the English and Canadian classification, is as follows: (a) derangements and disabilities of joints including ankylosis; (b) deformities and disabilities of feet; (c) malunited and ununited fractures; (d) injuries to ligaments, muscles and tendons; (e) cases requiring tendon transplantation or other treatment for irreparable destruction of nerves; (f) nerve injuries accompanied by fractures or stiffness of joints; (g) cases requiring surgical appliances.

With regard to the various forms of affections which have disabled these men, an analysis of about 3000 Canadian returned men was made in 1915 with the following percentages, which may be taken as indicating about what we may expect:

	Per cent
Major amputations	13.9
Other permanent injuries to extremities	26.7
Other injuries and wounds	12.2
Eyesight and deafness cases	13
Diseases of chest and heart and rheumatism	23.8
Nervous diseases	4.7
Miscellaneous disabilities	5.7

Generalizing from these figures Rubinow[1] estimates that in an army of one million,

[1] Rubinow. Red Cross Inst. for Crippled and Disabled Men. 1918, Feb., Ser. 1, No. 14.

operating for a year, some 40,000 men may be expected to be disabled through serious injuries to their extremities and therefore to require special placement facilities or vocational re-education. An estimate of the probable character and distribution of these injuries is as follows:

Amputation of leg	7,100
Amputation of arm	5,800
Amputation of hand	700
Injuries to leg not requiring amputation	9,500
Injuries to arm not requiring amputation	9,100
Injuries to hand requiring partial or no amputation	7,800
	40,000

Relation of soldier to military establishment. The first serious question which arises at this point is, What shall be the relation of the returned disabled soldier to the military establishment? Shall he remain under military discipline or shall he be discharged? If he requires no further treatment and can return to his former occupation he can obviously be discharged. If he requires further treatment it is the general opinion that he should remain in the army and under military discipline until such treatment is nearly or wholly completed. If after his treatment or toward the close of it, he requires re-education or vocational training for a new occupation there are divergent views as to whether he should receive this from military or civil sources.

It is urged in favor of civilian control, (1) that private control is free from embarrassing limitations due to legislation; (2) that the services of experts would be available who are not available for government service; (3) that the use of private funds would be obtained; (4) that diverse civilian agencies now in

existence could be utilized. In favor of government control it is said that (1) the government has charge of the soldiers when they return and is under the immediate need of providing for them; (2) experience has shown that soldiers so far as possible should be rehabilitated in their own communities and that this geographical distribution can most easily be carried out by the government; (3) if military control during re-education is necessary, the government alone can exercise that; (4) the training of teachers for the work should be carried on by the government; (5) the government is in a position to utilize agencies which civilian control could not command; (6) the governmental better than any other control, could command co-operation in placing these men in positions after their rehabilitation is finished; (7) private control implies that these men are wards of charity rather than the recipients of their just dues and the continuance of private support is precarious.

Re-education is practically obligatory in Germany, Austria, Italy, and Belgium, although even in these countries they are unable to persuade a certain percentage of disabled soldiers to undergo re-education. In France the whole matter is in charge of an interministereal commission called the French National Office. The training offered is not obligatory in the strictest sense because honorable discharge may be granted before the course of training is complete and after this the wounded man is free to do as he pleases. "Undoubtedly some means will have to be found by which re-education can be made to hold a greater appeal to disabled men." [1] Facilities for re-education are un-

[1] War Dept. Office of the Surgeon General. Bulletin No. 3

equal to the demands, inasmuch as France can only provide for 7000 to 8000 men each year and there are approximately 300,000 war disabled to date. In Great Britain when men are discharged from the service, they are referred to a local committee. Training is not compulsory but it is the duty of the local committee to urge it upon disabled men. Treatment will be provided at the state's expense even after discharge. If he refuses training half of his pension may be withheld. During training he is paid as if he were totally disabled and his family receives the same allowance that they would if he were dead.[1]

It would seem as if uniformity of conditions in treatment and re-education were better insured by government control as the soldier is then in the hands of specialists controlled by the medical department, he is associated with other men similarly handicapped and his tendency to self commiseration is thereby diminished and he is far less likely to mental demoralization than if he were turned loose to be cared for by private charity administered in civilian institutions.

The advantage of standardization of morale and methods is great and this would imply that if government control of these men is to exist they must be treated in military hospitals, and that civilian institutions could not be used unless wholly turned over to the government for the purpose, because the utilization of civilian institutions would mean civilian control of men in service or a divided control. The possibility of the former can perhaps be only appreciated by those who have seen the returned men under these conditions. After months or years of hard ex-

[1] Faries. Magazine for Care of Cripples, 1918, March.

acting work, they find themselves idle and disabled with their future to a certain extent unsettled. They resent the idleness, they are inclined to be mentally unstable and unruly, and at no time in their career do they need a firmer hand than during their early convalescence. A civilian institution filled with such patients would be a constant state of ferment, unrest and inefficiency. With regard to dual control of such institutions, that was tried out in Canada where the hospital's commission, a civilian board, and the medical corps shared equally in the control of the reconstruction hospitals. The disadvantages of the scheme were such in the way of duplication of all administrative machinery, that after one or two changes a scheme has recently been adopted by which the whole matter has been placed in the hands of a new department of the Government of Canada known as the Department of Soldiers' Civil Re-establishment over which a Minister of Soldiers' Civil Re-establishment presides. The duties of the department comprise the providing of hospitals, convalescent homes, and sanatoria; the vocational education and other training, and all matters relating to pensions of disabled soldiers.

Civilian institutions are naturally anxious to be of use and much pressure has been brought to bear on the government to use such institutions, but it would seem that the best results were to be obtained if returned disabled soldiers remain in the army and are not discharged until their treatment has been nearly or wholly completed, and that this should be carried on in military institutions under military control, so far as proves practicable. It will often happen that the man's treatment and vocational training must go

on contemporaneously. His status under these conditions will have to be determined in each individual case, but the weight of opinion is to the effect that treatment will be more effective when carried out under military control.

To return to the program of the individual soldier. At the conclusion of his furlough or if no furlough is practicable, the returned disabled soldier is sent to a reconstruction hospital, and it is important that idleness should be terminated as soon as may be. Here he is carefully examined, his disability investigated, and analyzed, his needs formulated, the question of an operation to improve his defect considered and if necessary performed. After this the question of his treatment is considered. If he requires an artificial limb, his stump is prepared for its application. Very often the joint of the hip, for example, has become stiffened in a position which makes it difficult or impossible to use an artificial leg.

The artificial limb question has been settled by Canada, by the establishment of artificial limb factories administered by the Government, where such appliances may be turned out of standard pattern at a cost much less than that asked by the commercial manufacturers. These limbs are fitted under the supervision of the surgeon and the patient instructed in their use.

If stiffened joints exist, the question of their mobilization arises by operation or therapeutic means. Paralysis is analyzed and the possibility of the restoration of some degree of nerve power discussed. Ulcers from wounds, badly united and ununited fractures and similar disabilities are placed under proper treatment and operated on if need be.

Before discussing the strictly medical and

surgical aspect of the treatment, something more must be said of the psychology of the disabled soldier. He has been living under discipline, under great stress and excitement at times, he has been under orders and has not had to think for himself when, suddenly he finds himself partially or wholly disabled, his former occupation can perhaps no longer be carried on, he has a family dependent on him and his future is uncertain, he is inactive and perhaps has to remain in bed for weeks. He must not be classed with the ordinary hospital patient; he has special needs, he may be unable to read or not interested in being read to, while for games or cards he may have no aptitude, yet he must be given some occupation, and here comes in the usefulness of the so-called *bedside occupation* which should be begun as early in his career as possible.

The so-called bedside aides, here find their usefulness in teaching simple and useful occupations to these men. The teachers themselves will have to be trained in many or most instances, but it takes a short time to learn enough of basket making, knitting, block printing, weaving (hand looms and bead looms), etc., to teach a man who does not know the first rudiments of such things. In this line of work comes the first introduction to vocational training and it serves a useful purpose in occupying the man in the manufacture of something which can be used by somebody and immediate improvement in morale is often noticed.

The attitude which the public should take toward these men has already been spoken of but not less important is the attitude which such a man should take toward himself. Self pity is demoralizing and detrimental; courage and self-reliance and sanity cannot

be taught by lectures but in the helpful stimulating attitude of those who come into contact with these men in the early days of their reconstruction. Such help should begin as far back as the base hospital where the mental needs of the soldier should be met, and occupation if possible provided. During the voyage he should have some such cheerful companionship and occupational therapy should be at hand to prevent mental demoralization.

PHYSICAL THERAPEUTICS

The therapeutic measures at our disposal which have proved useful in such injuries in civil life in the past and have shown their value in war conditions are as follows:

1. *Massage* is used to restore tone to the muscles, stimulate local circulation, to loosen up scars and diminish swelling, and for this need we must educate competent operators. It is responsible business and not to be handed over to every person in civil life who calls himself a masseur. A school must be established for the training of competent operators, a standard of excellence must be decided upon and the soldier must be protected against careless and perhaps harmful manipulation.

2. Medical or therapeutic *gymnastics* must be given with a purpose of improving the general condition, of increasing resistance to fatigue, of loosening up stiffened joints, of improving the strength of weakened or paralyzed muscles, etc. They have been long recognized as effective and in war conditions have proved of the greatest value. They must, however, be given with care, skill and judgment by competent operators.

3. *Mechanotherapy*. Another department of physical therapeutics would consist of what would be called mechanotherapy,

used chiefly for the mobilization of stiffened joints and development of weak muscles where machines of greater or less complexity are used instead of manual stretching and manipulation. The pendulum principle has been extensively used, the rhythmical swing and graduated force being effective. Simple apparatus is devised by certain men to suit their own needs[1] and complicated ones are of the type of the Zander apparatus.

4. *Hydrotherapy.* In physical therapeutics would be included hydrotherapy or water treatment by baths, douches, sprays, etc., which are of use in promoting local or general circulation, removing local congestion and thickening, and stimulating the general condition.

5. *Electricity.* Treatment by electricity or electrotherapeutics has shown itself to be of value in nerve injuries, local muscular weakness, or paralysis and similar conditions.

6. *Heat.* The use of hot air and radiant heat from gas-heated ovens and from electric light bulbs has long been known to reduce local congestion and swelling, to allay local pain and tenderness, and to diminish, along with the other measures mentioned, joint stiffness.

7. *Games.* There may be grouped in this division of physical therapy the use of games, fencing, bowling and similar exercises to improve the general condition and to mobilize partly stiffened joints.

8. *Muscular re-education.* Muscular re-education or functional re-education of the physical therapeutic measures is the last to be considered. Here the attempt is made to teach muscles to resume their normal functions, wholly or partly lost by injury, or by

[1] Mackenzie. Brit. M. J., 1916, Aug. 12.

so-called shell shock. Long recognized as of value in the treatment of paralysis it has assumed especial importance in the treatment of the returned soldier and has been particularly elaborated and formulated by Prof. E. A. Bott of the University of Toronto.[1]

Curative workshops. The value of the measures mentioned under physical therapy cannot be overestimated and have been demonstrated as never before in the case of the disabled soldier, but these measures possess the disadvantage of monotony, they have no definite use beyond the improvement of the individual, and carried out over a long period the soldier loses interest and becomes stale. The tendency has therefore of late arisen to substitute for them some occupation by the performance of which some of the same aims may be accomplished, and this introduces the question of the curative workshop which has assumed great importance. The introduction to the curative workshop has been offered to many of the soldiers by a preliminary use of bedside occupation. The curative workshop represents the most important and the newest feature of the second phase of reconstruction. You will remember that the first phase concerned itself with surgical repair by operation or treatment or both. The second phase opened with bedside occupation already described to which succeeds the curative workshop, which completes the second phase. The third stage, not yet taken up, deals with vocational training. These stages overlap and are naturally not wholly distinct. They are repeated here in the hope of making a new and rather complicated matter a little plainer.

[1] Univ. Toronto Monthly, 1917, April.

Sir Alfred Keogh, K.C.B., formerly Director General of the British Army Medical Service speaks of the curative workshop as follows:[1] "Nothing has been more remarkable than the overthrow of the old-fashioned purposeless orthopedic exercises for the cure of muscle weakness, stiff joints, etc. Under the influence of Colonel Sir Robert Jones, C.B., useful manual work has largely supplanted the older system of mechanotherapy. The bench, the workshop, and the gymnasium provide for the active movements of joints and of limbs, in contradistinction to the, for the most part, passive movements of the appliances hitherto in use, while at the same time the patient, being provided with a useful occupation, lends himself more readily to the treatment prescribed for him and becomes interested in it. The chief point to remember is that each piece of work performed is a prescription ordered by the surgeon for a specific joint or muscle disability."

Colonel Sir Robert Jones, Inspector of Military Orthopedics, who is in large measure responsible for the development of the curative workshops says: "As soon as the patient is fit to get about he should have some occupation both for his mental, moral and physical welfare. Here the curative workshop is an invaluable aid to his gymnastic treatment. . . . Excellent and useful as systematic gymnastic training is for developing movement, the training in co-ordination in doing purposeful work is what really brings brain and muscle once more into proper accord, while regular daily work re-establishes in the patient habits of responsibility and self respect . . . for example a man with stiff fingers

[1] Bulletin No. 6. Federal Board for Vocational Education, 1918, Feb., p. 46.

barely able to grasp even fairly large objects, is soon utterly wearied if set to grasp spring dumb bells or any other such apparatus, but will cheerfully spend the morning grasping a big duster and cleaning windows. . . . Later if he is a carpenter or other skilled tradesman, he is promoted to the use of tools he understands, and so the disabled is re-educated partly by set gymnastic exercises and largely by work. Driving a plane in the carpenter's work can be employed for exercising muscles and joints in both arms and legs. . . . His brain is interested in what his hands are doing and not wearied by the curative action which the trade brings about."

In the choice of the special department of the curative workshop to which the man shall be first assigned depends almost wholly on the therapeutic needs of that man. It may be that he requires only occupation for his general physical and mental condition to enable him to resist fatigue better, to improve his circulation and muscle tone. For such men it matters little which of the divisions of the work they take up, but in general it is obviously desirable for them to take up some occupation which would be preliminary and introductory to their vocational training. If the man, on the other hand, has stiff joints or shortened muscles, then his assignment in the curative workshop must be made with much care. The most common trades used in such shops are carpentry, metal work, the use of lathes, leather work, cobbling, tailoring, net making, basket making, drafting, etc.

In cases where the curative workshop is used mainly for loosening up joints and muscles the application would be much as follows: If the wrist is stiff and the circulation of the hand poor, the use of a carpenter's plane

is prescribed which will necessitate the use of both fingers and hands. The stroke at first will be short but as it is lengthened it exercises more effect upon both wrist and fingers. If pronation and supination are limited the board to be planed may be slanted more and more which exercises a new line of force. If the elbow is stiff the patient starts using a saw with a short blade and the length of the saw and the length of the stroke are gradually increased to exercise more force upon the stiff elbow. Other carpenter's tools of use for their corrective effect on arm and hand are the gimlet or screwdriver, the bit stock, etc. Basket work and net making are excellent for loosening up stiff fingers. For stiff ankles and knees, pedal driven fret saws, foot lathes or foot-driven machines of almost any nature mobilize the joints of the lower extremity. In the curative workshop, utilized only as such, there need be very few trades, carpentry being the most generally applicable and the material output is not important because the main object is therapeutic. The curative workshop is situated in the reconstruction hospital and is more closely affiliated to the medical than to the vocational aspect of the work, because its use is to replace and supplement such measures as massage, etc., which would naturally come into the medical division. In general the medical division of the work would run through the curative workshop, and in the period of vocational training the vocational adviser would be in charge. But there must needs be overlapping, and the vocational trainer would probably have the technical administration of the curative workshop to carry out the prescriptions of the medical officer. The medical officer would naturally be consulted

as to the man's capacity for one or another form of vocational training. In this overlapping would be found common ground for both medical and vocational experts.

As to the size of the problem of vocational re-education, the estimates of the Federal Board of Vocational Training in their report of February, 1918, are as follows: "The latest report of Canadian experience states that practically 10 per cent of the Canadian forces overseas have been returned as unfit for military service. . . . Of the men returned unfit for military service 80 per cent or four-fifths, return to their former occupations without vocational training and 20 per cent require vocational training. One-half of those requiring vocational training, require complete vocational education, and one-half, partial vocational re-education. Accepting these ratios as significant for the overseas forces of the United States and assuming that the United States will send over 1,000,000 men the first year and will increase its expeditionary force by 1,000,000 each year for the duration of the war. The following deductions are, perhaps, warranted, as forecasting conditions at the close of one year of fighting.

Number of men overseas	1,000,000
Number of men returned unfit for military service	100,000
Number not requiring vocational re-education	80,000
Number requiring vocational re-education, complete	10,000
Number requiring vocational re-education, partial	10,000

In a word, for each million men overseas it may perhaps fairly be expected that 100,000 men will be returned each year, of whom 20,000 will require complete or partial

vocational re-education. This number of men may in fact be in hand to be provided for by the close of the summer campaign of 1918." It is evident therefore that the question of vocational training must be taken up on a large scale and first one must consider certain aspects of the matter which seem fundamental. These are: (1) The new trade should be so far as possible affiliated to and like the former occupation. Instances of this would be where a house painter would become a sign painter; a barber a wig maker; a mason or a carpenter a draftsman or architect's clerk. The house painter with disabled legs would make a poor wigmaker and the barber, a poor sign painter. A mechanic was earning three dollars a day before the war and was disabled. He was given a course of ten weeks in mechanical drawing and now earns twice as much. (2) The new occupation if it cannot closely resemble the old one, should be one adapted to the individual's capacity and education. This is less important than it might seem because the experience of a year in Belgium has seemed to show that the choice of the original occupation was usually haphazard (De Paew). As examples of this change of occupation, a waiter whose right arm was disabled took up sign painting with his left hand and in six months became a master workman. A clown disabled for the ring became a most successful ornamental printer. A man before the war had driven a team and worked on a pile driver at fifteen to eighteen dollars a week and is now earning thirty dollars as a machinist. (3) The occupation should be one in which there will be a demand for workers after the war. This, of course, is self-evident, but further than this, the man should be educated along the lines

for which there is demand in his special community.

The man whose home is in the country would be educated along agricultural lines and the man from the large cities in manufacturing, salesmanship, stenography, etc. This need is not compelling but, in general, an occupation should be selected which would not necessarily mean a change of residence. (4) In certain instances the man's special technical vocational training must be preceded by some general education in such fundamental studies as reading, writing and arithmetic, which will enable him to qualify for some position not necessitating manual labor for which he may have been wholly incapacitated. A soldier writes, "When I came back from the front in October, 1916, I was not able to read or write. . . . Before the war I was driving a team at fifteen dollars a week." He took a course in the machine shop at McGill and says: "If it had not been for the school I never would have been in the place where I am today, and I expect to get about thirty dollars a week."

The selection of a new occupation will rest with the vocational director after consulting with the surgeon as to the man's special disability. The director talks with the man, makes a survey of his education and previous trade, his mentality and his tastes, tells him of the successes of other re-educated men and encourages him to ambition and hopefulness. At Port Villez in Belgium, for instance, after this, the man is allowed to visit the workshops where there are forty-eight trades. He walks about them, talks to the men employed, and is given two or three days to consider the matter. He then comes before a board consisting of the surgeon, the technical director

and the vocational director and with their assistance, chooses a trade provisionally in which he goes to work. If this proves unsuitable he may change, but changing and uncertainty are discouraged. There are two practical obstacles found on the part of the soldier to vocational training. First, laziness, and second, the fear that if he is physically improved his pension will be cut down. This latter matter has been dealt with by provisions that the man's pension is estimated on his original injury and is not affected by his improvement. This is regarded in Canada as so important that in convalescent homes and hospitals there is posted a statement that pensions depend solely upon degree of disability and are not influenced by increased earning power.

The trades which are taught need not be mentioned individually. They may be divided roughly into three groups.

1. Industrial. Trades, machine work, blacksmithing, metal work, carpentry, tailoring, brushmaking, shoemaking, leather work, box making, toy making, bookbinding, manufacture and repair of artificial limbs, etc.

2. Commercial. Clerical occupations. Stenography, telegraphy, designing, bookkeeping, mechanical drafting, etc.

3. Agricultural pursuits.

Placement. Finally comes the terminal stage of vocational training, that of placing the man in a permanent position. Here again the public and through it, the manufacturers, must be educated to paying the country's debt to these men by employing them. There is to be met the natural reluctance of the manufacturer to employ a man for whom he fears he may have to make allowances and the possible opposition of labor with regard to

these. The statement is made in *American Industries* for October, 1917: "There is an almost universal willingness on the part of manufacturers to give every opportunity to our workers who may be injured or crippled in the war." F. W. Keogh, editor of *American Industries*, the organ of the National Association of Manufacturers in a recent speech quoted the president of that association as saying: "I am first an American and a patriot and as such I will aid these men in every way possible. I am also a manufacturer with economical responsibilities to my stockholders, employees and others, and as such I cannot consider these men as employees unless I am convinced it is a sound business proposition." Fortunately evidence so far collected proves that the disabled soldier can return to industry as a sound business proposition for the manufacturers and for this reason it is essential that his training should be thorough so that in the years following the war he may be able to hold his own.

The attitude of labor toward these men is also a great factor. The general attitude of the British labor party as to treatment of disablement by war is that every possible opportunity should be offered for securing the best treatment and that every appliance that science can suggest should be devoted to the restoration and aid of those who have become disabled[1] and the labor party favors the opening up of every possible avenue of training to every man who desires to avail himself of it. The British trades unions are not only sympathetic but desire to assist the disabled man in every possible way to secure employment on remunerative work provided

[1] Monthly Review United States Bureau of Labor Statistics. 1917, Dec.

that there should be no dimunition in the standard of living or possibility of the disabled man being used to defeat the legitimate objects which the trade unions have in view. The man's first placement is of importance because no subsequent one will be so easily brought about.

The requirements for success in the whole of vocational re-education are judicious selection of the new trade, the utmost thoroughness in training, care, and discretion in placement.

Training of teachers. The training of teachers for bedside occupation, curative workshops and vocational training and especially finding men for the responsible post of vocational directors is another of the problems confronting us. The Federal Board for Vocational Education estimates that four teachers will be needed for every hundred disabled soldiers, and regards this as an undesirably low figure. On this basis, for every million men overseas, there will be required here 1200 such teachers. The provisions for educating these teachers are being considered by the Federal Board for Vocational Training as presented in a special Bulletin No. 5.

Industrial accidents. There will be a by-product of the war and its experiences which has been mentioned, and this is the fact that rehabilitation of those disabled in the industries will in the future be practised in the light of what we shall have learned from the rehabilitation of those disabled in war. In 1913 there were 700,000 industrial accidents in the United States involving more than a four weeks disability. In Scandinavia, Belgium, and France, there existed before the war trade schools for the re-education of those crippled by industrial accidents. There were also schools in Petrograd and Munich, but

in this country the matter has never received serious consideration. Professor Amar may be quoted as saying: "The war will be over but the industrial work and the necessity for the scientific study and physical organization of it will be with us forever." A report of the Federal Board for Vocational Re-education summarizes the matter of our negligence as follows: "It is certain, however, that our economic future depends to a large extent upon the rehabilitation of those disabled both in war and industry. . . . The time has passed when the supply of skilled labor is as inexhaustible as our natural resources were thought to be. We can no longer afford to continue our former wasteful methods and we must conserve every vestige of labor as an economic asset." (Bulletin No. 6.) The problem of the industrial cripple cannot be lightly dismissed for its size and economic importance are very great. From a study of industrial accidents in sixteen states, figures made available by the publication of state bureaus, checked up by the standard accident table and Bulletin 203 of the Department of Labor, Rubinow drew the following conclusions: Of the 26,136,676 employees in the different states covered or not covered by the compensation law, there are about 1,900,000 non-fatal accidents per year. Estimating the number of permanent disabilities produced annually by industrial accidents in the United States, Rubinow[1] arrived at a mean estimate of about 83,000 per year. In 1916 there were injured on the steam railroads 196,722, not counting 10,000 deaths, and on the electric roads 4,606. That is practically 200,000 people. Naturally many of these accidents

[1] Publication of the Red Cross Institutions for Crippled and Disabled Men, Series 6, No. 4.

were unimportant and not disabling but in 200,000 injured on steam or electric cars there would obviously be a fair proportion of disabled persons. In April,[1] 1916, the Philadelphia branch of the Pennsylvania State Bureau of Employment, established a department for the placement of handicapped workers and visited fifty-five of the leading industrial firms in Philadelphia and made "progress toward overcoming the innate prejudice against the employment of cripples." Many instances are given of workers thus placed who are earning surprisingly good wages.

SUMMARY

The difficulty of presenting this question of reconstruction must be evident. It is a new subject, only in its formative stage as yet, practically dating from 1915. There are many disputed points and many matters of policy yet unsettled and no mechanism has existed in the past for formulating and carrying on the demands which must be met.

In this matter we are not discussing a new form of charity, but are trying to formulate a plan to discharge a pressing obligation. Success depends upon sound public sentiment, and sentimentality and emotionalism have no place in the scheme; the government, the public, the manufacturer, the labor unions and the medical profession must join hands, and different points of view must be minimized for the common welfare. This is no small question which we face; it would be better for most of the seriously wounded men to die on the battlefield than for us to fail in our duty of efficiently caring for them and restoring them to the highest possible degree

[1] Am. J. Care of Cripples, 1917, June.

of economic efficiency. Let us hold up the hands of the Government in carrying out the carefully formulated and studied plans which will be announced in due time and let us remember that destructive criticism is easy and constructive organization difficult.

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